Biotechnological Innovations in Animal Productivity. Edited by N. A. A. MACFARLANE. Biotol. Butterworth-Heinemann, Oxford. 1991. Softcover. 209 pages. £19.95. ISBN 0 7506 1511 7.

This volume is one of a series, 'Biotechnology by open learning'. In an introduction the editors suggest: 'An open learning text presents to you a very carefully thought-out programme of study to achieve stated learning objectives, just as a lecturer does. Rather than just listening to a lecture once, and trying to make notes at the same time, you can with a BIOTOL text study at your own pace, go back over bits you are unsure about and study wherever you choose. Of great importance are the self-assessment questions (SAQs), which challenge your understanding and progress, and the responses, which provide some help if you have had difficulty. These SAQs are carefully thought out to check that you are indeed achieving the set objectives and are a very important part of your study.'

There are six chapters sandwiched between an introductory chapter and two appendices, which are concerned with EEC directives and the endocrine system. A large part of the book is concerned with methods which depend upon embryo production and manipulation, so that it is appropriate that four of the technical chapters are concerned with this aspect of biotechnology.

In the first of the technical chapters there is a detailed consideration of the regulation of the oestrous cycle, particularly in the sheep, with discussion of the role of the hypothalamus, pituitary, ovary and uterus. There is no mention of the role of oxytocin in the regulation of the oestrous cycle. In the second, there is a description of the pharmacological control of the time of oestrus, ovulation, and parturition and the induction of superovulation. A further chapter describes methods of embryo manipulation, including the production of embryos by *in vitro* maturation, fertilization and culture, embryo splitting and nuclear transfer. There are brief descriptions of methods for embryo storage, the discovery of the sex of an embryo and gene transfer by direct injection of DNA. In the fourth of the technical chapters there is detailed description of methods for gene transfer, the regulation of gene expression and the signals required for correct processing of proteins.

The use of recombinant growth hormone to promote either growth or milk production has been the subject of extensive experimentation and considerable public debate. The next chapter provides a well-balanced description of the nature of the protein, the method by which it is produced, the effects upon the animals treated and the economic implications of the use of the hormone. The final chapter concerned with techniques describes the nature of the immune response, the production of conventional and recombinant vaccines and the use of antibodies in diagnosis.

The greatest drawback to this book is that there are no references, nor even a bibliography, so that it provides no help for the student who wishes to delve a little deeper into the subject. By contrast, the book has many strong points. It is up to date, there are many fine diagrams, the questions are thought-provoking and the price is very reasonable. There is brief mention of ethical concerns throughout the book. It certainly found immediate use in the hands of two overseas postgraduate students working in this laboratory. I recommend it strongly to undergraduates in agriculture, veterinary or biological science. For those studying alone, either for an Open University course, for day release or evening class, or for those working to acquire new skills and understanding, the questions and answers will be invaluable aids.

IAN WILMUT
AFRC Institute of Animal Physiology and Genetics Research,
Roslin, Midlothian EH25 9PS

Symbiosis as a Source of Evolutionary Innovation: Speciation and Morphogenesis. Edited by LYNN MARGULIS and RENÉ FESTER. MIT Press, Cambridge, Mass. and London. 1991. £33.75 in U.K. ISBN 0 262 13269 9

This volume contains a set of articles written by the participants in a conference at Bellagio, Italy, in 1989, under the guidance of Lynn Margulis. The old idea that mitochondria and plastids were originally derived from bacteria and algae, respectively, and have evolved into their present forms by some process of symbiosis, was revived some years ago by Dr Margulis. Support for this idea, especially from work on the molecular homologies between microorganisms and eukaryotic cells, has now made it, as W. Schwemmler puts it in chapter 14 of this book, 'nearly certain'. This reviewer is grateful for the insertion of the word 'nearly' in that sentence.

According to Margulis, the serial endosymbiotic theory has now been transformed from an 'amusing ingenuity' into a 'respectable alternative', and is now a preferred explanation for the origin of plastids and mitochondria. Some authors extend these notions much further and now propose that the major steps in evolution generally (or mega mutations) have arisen not by the conventional neo-Darwinist process of a slow accumulation of mutations guided by Natural Selection, but by the symbiotic incorporation of one organism into another, followed by a liberal transfer of genes between endosymbiont and host. However attractive such an idea may be as an abstract conception, its experimental proof is by the nature of things unobtainable. One approach to this problem is provided by the work of Kwang Jeon, who describes some rather surprising results of experiments in which certain bacteria are injected into amoebae. A symbiotic relation between bacteria and amoebae is established,